

IN THE CLAIMS

Please enter the following amendments to the claims.

19. (currently amended) A method of plating comprising:
providing an aqueous electroplating composition, comprising:
copper;
at least one acid, selected from sulfuric, methane sulfonic,
amidosulfuric, aminoacetic, fluoboric, and mixtures thereof;
at least one halogen ion;
~~at least one additive, selected from an accelerating agent, a suppressing agent, and an suppressing-accelerating agent~~ a combination of additives comprising a suppressing agent and an accelerating-suppressing agent; and
the solution and mixture products thereof;
contacting a substrate with the plating composition; and
impressing a multi-step direct-current waveform potential upon the substrate, wherein the multi-step direct current waveform potential comprises a stepped changing current density.
20. (original) The method of plating according to claim 19, wherein impressing a multi-step direct-current waveform potential upon the substrate further comprises:
applying a direct-current waveform potential upon the aqueous electroplating composition before contacting the substrate therewith.
21. (original) The method of plating according to claim 19, wherein the method further comprises:

pre-treating the substrate with a composition selected from deionized water, distilled water, an acid, a base, a solvent, a reducing agent, and mixtures thereof.

22. (original) The method of plating according to claim 19, wherein the contacting the substrate comprises rotating the substrate relative to the plating composition at a rate in a range from about 0 to about 500 rpm.

23. (original) The method of plating according to claim 19, wherein contacting the substrate comprises supplying plating composition at a rate from about 3 L/min to about 60 L/min.

24. (original) The method of plating according to claim 19, wherein the plating composition is maintained in a temperature range from about 7 C to about 35 C.

25. (original) The method of plating according to claim 19, wherein the multi-step direct current waveform potential comprises a stepped changing current density that comprises:

a nucleation current density; followed by

an initiation current density; followed by

at least one cycle of a fill current density that comprises a first forward pulse current density and a second reverse pulse current density; and followed by

a bulk fill current density.

26. (original) The method of plating according to claim 19, wherein the multi-step direct current waveform potential comprises a stepped increasing current density that comprises:

a nucleation current density in a range from about 3 mA/cm² to about 70 mA/cm².

27. (original) The method of plating according to claim 19, wherein the at least one cycle of a fill current density that comprises a first forward pulse current density and a second reverse pulse current density comprises cycles in the range from 1ns to about 1 min.

28. (original) The method of plating according to claim 19, before contacting a substrate with the plating composition, the method further comprising:

forming a seed layer comprising copper upon the substrate, wherein forming a seed layer is selected from physical vapor deposition and chemical vapor deposition.

Claims 29 – 32 (Cancelled)

33. (new) A method of plating comprising:

providing aqueous electroplating composition, comprising:

copper;

at least one acid, selected from sulfuric, methane sulfonic, amidosulfuric, aminoacetic, fluoboric, and mixtures thereof;

at least one halogen ion;

a combination of additives comprising an accelerating agent and an accelerating-suppressing agent; and

the solution and mixture products thereof;

contacting a substrate with the plating composition; and

impressing a multi-step direct-current waveform potential upon the substrate, wherein the multi-step direct current waveform potential comprises a stepped changing current density.

34. (new) The method of claim 33, wherein providing the aqueous electroplating composition comprising the combination of additives comprising the accelerating agent and the accelerating-suppressing agent further comprises selecting the accelerating-suppressing agent from the group consisting of DPS, N,N-dimethyl-dithiocarbamyl propyl sulfonic acid, and a sodium salt having the configuration of $(\text{CH}_3)_2\text{N-S-C-S}(\text{CH}_2)_2\text{SO}_3\text{Na}$.

35. (new) The method of claim 33, wherein providing the aqueous electroplating composition comprising the combination of additives comprising the accelerating agent and the accelerating-suppressing agent further comprises a suppressing agent.